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CONTENTS

Tryptophane as a Preventive for Caries 53
Naomi C. Turner

Six Student Dietitians Experiment in School Nutrition 58
Elizabeth Stewart

A Hot Lunch for Small Schools 62
Verna Payson

Hot Lunch Program 65
Ruth M. Cutter

Health Supervision in New Hampshire Schools 68
Elizabeth M. Murphy

Editorial 72

Abstracts and Notes 57, 61, 64, 71, 72

Notice—Committee on Standards 78

Meetings 78

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THE JOURNAL OF SCHOOL HEALTH

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Vol. XV MARCH, 1945 No. 3

TRYPTOPHANE AS A PREVENTIVE FOR CARIES

NAOMI C. TURNER

The essential amino acid tryptophane has distinct promise as a preventive agent for dental caries. This promise is based on tryptophane's selective action among the amino acids in delaying the amyloclastic phase of starch hydrolysis.

A correlation has been shown between the rate of saliva-induced starch hydrolysis and the amount of caries in the mouth, in a case study of 51 individuals at the Forsyth Dental Infirmary.[1] Individuals with extensive caries (twenty or more cavities) produce saliva which hydrolyzes starch under standard test conditions with extreme rapidity. Individuals with little or no caries produce saliva which hydrolyzes starch very slowly.

After establishing a correlation between the rate of the breakdown action of saliva on starch and the degree of caries, we sought a substance which would delay the action of fast hydrolyzing saliva. In consideration of Wohlgemuth's[2] findings in relation to leucine and alanine, E. M. Crane suggested looking to the amino acids for a delaying material.

Because it has been shown that high protein (low carbohydrate) diet has a favorable effect on caries,[3] this seemed a logical suggestion and work was undertaken to see, whether on a spot plate, a delay could be effected. Using the same test procedure employed in the Forsyth correlation,[4] a series of amino acids were added to fast hydrolyzing saliva. After considerable trial and error 0.01 molar was selected as the concentration for the animo acids. In running the tests 1 cc of the test solution, 2 cc saliva, and 1 cc 2% starch solution were used. For the blanks water replaced the test solution. Results are shown in Table 1.

TABLE 1

Effects of Certain Amino Acids and Amines on Fast Hydrolyzing Saliva

	Hydrolyzing Time With Saliva Plus Water	With Saliva Plus Test Material
l (+) Glutamic acid	8 min.	2 min.
	7	2
	6	2
l (—) Histidine dihydrochloride	8	2
l (—) Histidine dihydrochloride in buffer pH 6. 6	11	7
Glycine	4	2
	14	12
l (+) Lysine monohydrochloride	8	6
l (+) Lysine monohydrochloride in buffer pH 6. 6	4	2
	11	9
	2	2
l (—) Tyrosine	4	4
	4	4
l (—) Proline	4	5
	14	12
	2	3
l (—) Leucine	11	13
	4	7
dl Alanine	2	6
	2	5
dl Methionine	2	5
	2	5
	2	8
l (—) Cystine*	4	10
	4	10
	4	40
	5	31
	3	39
l (—) Tryptophane	5	40
	8	36
	4	38
	8	38
Indole	5	14
	3	32
Pyrrole (freshly distilled)	4	40
	2	45

* Insoluble; aqueous suspension used.

L—glutamic acid, l—histidine dihydrochloride, glycine, and l—lysine monohydrochloride decrease slightly the hydrolyzing time of fast hydrolyzers; l—tyrosine and l—proline run parallel with the blanks; and l—leucine, dl—alanine, dl—methionine, and l—cystine increase the hydrolyzing time of fast hydrolyzers to a small extent. It is not until we come to tryptophane, however, that we find an amino acid which slows up hydrolysis to a rate comparable with that associated with caries-free teeth.

Of course it became of interest to try tryptophane derivatives. Indole is an effective delayer. Freshly distilled pyrrole appears as efficacious as tryptophane itself. It is possibly of interest that bone oil is a ready source of pyrrole, in view of Harootian's[5] findings that bone flour has a beneficial influence on caries.

If tryptophane has promise as a therapeutic agent in the prevention of caries, one would consider oral use, injection, and ingestion. Saliva drawn subsequently to rinsing the mouth with a 0.01 molar solution of tryptophane showed a delayed hydrolysis. Since it is difficult to stabilize tryptophane in solution, use in tooth powder or gum suggest themselves. Injection was discarded as being too difficult of general administration. The more promising procedure of ingestion has been studied in one individual.

Since the Forsyth study, a more easily read hydrolysis test has been developed.* Using this test, a base rate of 20 minutes (comparable to 4 minutes with Forsyth correlation test) was found by repeated trials, for the individual who subsequently ingested tryptophane. We are in agreement with Adams'[6] work which showed a remarkable constant in the time it took an individual's saliva to break down starch.

As a first trial .05 gram crystalline dl tryptophane was ingested; this having created no adverse physiologic disturbance, a .1 gram was taken the same day. Subsequent dosage and results are shown in Table 2.

*In testing with KI_3 as indicator the end points for hydrolysis time of saliva working on starch are read with difficulty. Blue, purple, and brown as they shade into each other are not easily differentiated. The more easily read test is the following:

To 1 cc fresh saliva add 1 cc 1% starch solution. In test tube or on spot plate draw off 3 drops saliva-starch mixture. Add 3 drops of 1% KI; then 5 drops H_2O_2. Watch development of color on thorough mixing. At fixed time intervals repeat. The end point is colorless or brown.

The advantage of the method is that one can pour white solutions together and watch the development of color instead of adding brown KI_3 and looking for a change to blue or purple versus a continuation of brown.

The amounts of H_2O_2 and KI as well as the proportion of starch to saliva are critical and must be constant if times of hydrolysis are to be compared. Temperature, too, is a critical factor. Use of a warm or a chilled test tube would introduce a variant.

TABLE 2

Day	Amount Tryptophane Ingested	Hydrolysis Time
1	.15	25 min.
2	.25	40 "
3	.5	90 "
4	.5	120 "
5	0	155 "
6	0	270 "
7	0	240 "

The interval required for hydrolysis subsequently decreased until it returned to the base rate of 20 minutes three weeks after the cumulative ingestion of 1.4 gram tryptophane was started. Four weeks after the first ingestion a second series of ingestions was undertaken with similar results and without evidence of sensitization,

This work with one individual would appear to show that tryptophane, or a derivative of tryptophane, reaches salivary amylase through ingestion and is strikingly effective in changing the nature of the amylase from one which hydrolyzes starch rapidly to one which hydrolyzes starch slowly. That there is a correlation between hydrolyzing time and caries has been shown. Whether the ingestion of tryptophane prevents decay remains to be established. This possibility is compatible with the results of Boyd[7], Howe[8], and Dietz[9].

Ordinarily a series of case studies would be completed before reporting results. We are reporting consistent results in the study of one individual confirming and extending the earlier spot plate studies at this time in order that desired and essential investigations upon the effect of tryptophane in reducing caries may be undertaken simultaneously by interested research workers.

In the writer's investigations, several individuals chosen at random for good teeth proved to be under a physician's care for metabolic disturbance; some of them were children of diabetics. Since tryptophane [10] is signally lacking among the amino acids found in insulin, we recalled for further testing a caries-free child whose mother is diabetic. The results showed that 0.01 molar glutamic acid changed this child's usual 32 minute (Forsyth method) hydrolyzing time to 1 minute. A 45 minute saliva from another individual was brought back to 2 minutes by the addition of .01 molar leucine. Insulin is 30% glutamic acid; 30% leucine.[10]

It is obvious that confirmatory studies are needed extending

to an investigation of optimal dosage, physiologic effects and the optimal hydrolysis rate, as well as long time comparative studies to determine whether and to what extent the ingestion of crystalline tryptophane or tryptophane rich proteins will prevent dental decay.

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* * * * *

Physical Fitness,—Among other services for promoting fitness in our schools, the School Health Survey and the Massachusetts Health Council rank highly among the school administrators.

The School Health Survey . . . is unique among Bay State schools. As far as is known Massachusetts is the only State Health Department in the country to conduct such a program. Here expert analysis and evaluation of the school's health program is rendered, without charge, to any school department requesting it.

Taking in every angle of the school program from the standpoint of health, this survey is carried out by a specialized corps of experts attuned to the needs and facilities of the school. The group consists of a physician, dentist, nurse, and nutritionist.

Nothing is overlooked . . . Hot lunches, health services, communicable disease control; health education; environmental conditions including sanitary drinking, washing and toilet facilities; heating, lighting, ventilation and safety provisions; and first aid; in fact, all influencing health factors are evaluated.

Results of the survey are incorporated into a set of recommendations . . . which provide a well-balanced school health program when carried out.

How the Town of X Benefited—A survey conducted in the Town of X revealed that housing facilities for the school children were not only over-crowded and inadequate, but a definite safety hazard. When informed of these findings, the school committee . . . came through with approval and funds for two new buildings.

"Bulletin of the Department of Public Health," January, 1945, pages 2-4.

SIX STUDENT DIETITIANS' EXPERIMENT IN SCHOOL NUTRITON

MISS ELIZABETH STEWART

Director of Dietetics, Good Samaritan Hospital, Portland 10, Oregon

The problems that war brings to all peoples are both complex and many. Some receive little notice and less planning than the more obvious, but the results will be within us for many years.

The development of ship building in Portland, Oregon, brought workers and their families from all sections of the United States to this area, causing such an overcrowding of public school facilities that the "double shift" is necessary in four elementary schools. In these schools the morning shift opens at 8:00 a.m. and closes at 12:40 p.m. At 1:00 p.m. the afternoon shift enters the rooms just vacated and is dismissed at 5:15. The kindergarten meets for the conventional school hours for that age group. In addition, the upper grades, namely the 6th, 7th, and 8th, attend school from 9:30 a.m. to 4:00 p.m. Each shift has a complete teaching staff. Mr. James Pelley of Sitton School is principal of one of these double shift schools.

Sitton Elementary School is located in the ship building area where 1500 families live in temporary government housing projects and in trailer camps covering an area of four square miles. Through cooperation, plans were worked out by the Division of School Hygiene and the Director of Dietectics of Good Samaritan Hospital, to carry out a functioning nutrition program in Sitton School. Because of the deep conviction of Mr. Pelley that nutrition plays a major role in development of the child, he had set the stage through a previously well worked out nutrition program. He was early troubled by evidence that many children were coming to school without breakfast, and that many were without set schedules for any meals.

One of the problems in a situation of this type is that of nutrition. Children attending the morning shift have a hurried early breakfast, if any at all, because the parents are not home from the graveyard shift or are hurrying to be on time for the day shift at the shipyards.

The habits of the adults are also bound up in the shifts—day, swing, or graveyard—at the shipyards. More often than not both parents work the same shift. However, it is increasingly evident

that the improved economic condition has not improved the families' eating habits.

The afternoon shift have breakfast at nine or ten o'clock, and the family do not plan another meal until five-thirty, six, or seven. This has challenged the school to meet the problem by instituting a noon cafeteria and a mid-morning and mid-afternoon snack bar.

The student dietitian was welcomed as an aide to develop this plan further and to bring suggestions to improve the existing food service. A food questionnaire that would reveal the food habits of the children was drawn up, circulated, and the results studied by the student dietitian and the Health and Nutrition Committee at Sitton School. The breakfast summaries indicated: (1) that 16% per cent of the children ate no breakfast; (2) 30% included "soft drinks"; (3) 60% ate no fruit. The luncheon summaries indicated: 72% showed a definite preference for starches. Questions about supper revealed that 8% of the children ate as late as eight or nine at night. In addition, the survey showed that a very young sister or the child himself was responsible for the preparation of the meal. The students believed that the survey corroborated and justified Mr. Pelley's plan for snacks and a hot noon meal.

A continuous nutritional program was arranged by sending successively a student dietitian for two weeks over a period of twelve weeks. The student dietitian started the day in conference with the staff dietitian at the hospital, and in conference at school she talked daily with either the principal or the teacher chairman of the Health Nutrition Committee.

The following outline indicates the type of service given to the school by the Student Dietitians of Good Samaritan Hospital:

I. Physical Improvements:

A. A new floor plan for the kitchen was drawn up.

B. Drawings were made for a pastry cooling rack, soiled dish table, wooden trays.

C. The adjoining recreation room was used as a dining room, and suggestions were made to use colorful food posters on the walls and to place the separate tables to form a pattern, rather than in long rows.

D. A coat rack was designed for this room. (The cooperation of the manual training department was enlisted in the building of these extra pieces of equipment.)

II. Food Service:

A. A big contribution made was the help given in "selling" the hot plate luncheon idea to the children. First the art de-

partment helped prepare an illustrated letter which was sent to the parents asking that the child be given twenty cents for the hot plate luncheon. This effort (and with a little urging by the teacher and student dietitian) brought the number sold from six to seventy-five. With the plate luncheon the child was assured a balanced diet, whereas, previously many of his a la carte selections had been chiefly starches such as baked beans and pie, or mashed potatoes, gravy, and cake. It was decided to discontinue serving pie and cake to the children, substituting instead a simple dessert of pudding, fruit, or ice cream, selling for an additional five cents.

B. The original snack luncheon had provided a great many food items. At the suggestion of the nutritionists, the variety was reduced to milk or soup, raw fruit or juice, and sandwich. Earlier this snack was set up in the hall near the kitchen, but now a movable cart is under consideration, which will be taken into the individual rooms, thus eliminating much confusion and inconvenience.

C. Another worthwhile project of one student nutritionist was the accumulating of suitable menus with priced recipes (prices being obtained from local stores), a simple cost accounting system, and forms for perpetual and physical inventory. About this time, a suggestion was given for the purchase of a book on cafeteria management. At the present time a student is helping with work schedules for kitchen employees. It should be mentioned here that the utmost cooperation was given by the cook in charge.

III. Nutrition Education:

A. The student dietitians as a group felt that the educational program was a most important contribution. One student made introductory nutrition talks in all rooms, laying a groundwork for subsequent talks by the room teachers. The very valuable nutrition kits published by the commercial food houses, colorful posters, and tests on teaching nutrition to children were suggested as aids for the teacher.

B. For some time, the doctor, principal, and nurse had been eager to receive help with individual nutrition problems, as symptoms of malnutrition were found during physical examinations of the children. The student accompanied the school nurse into the homes and talked with the parents on nutritional problems concerning their children.

C. One of the students had an opportunity to talk to the children about food as the doctor was examining them. Another talked to individual pupils while she was visiting in the school rooms.

Increased emphasis upon the nutritional program of the school has brought about many improvements in the reactions of pupils. Marked improvement in health and physical growth is revealed through the periodic health examinations and the cumulative health record cards of the pupils. Teachers are unanimous in reporting that there is less fatigue, especially at the end of the long sessions which are unbroken by the usual noon hour intermission. Interest in school has been increased and general morale improved by the food service. Patronage in the cafeteria has steadily increased, with the result that more money is taken so that food values can be further improved.

The fact that the school principal and teacher can play an important part in the physical growth and welfare of the child—when the desire to help is strong enough to surmount the obstacles in setting up such a program—was made evident to the student dietitians. They concluded that the busy school doctor and nurse could well employ a full time nutritionist. This project as a whole fully acquainted these girls with the splendid work being done for the children in health care by School Health Divisions as well as broadening the students' outlook on child nutrition.

* * * * *

Chipped China,—Answering an inquiry from Sue Hurst Thompson, M.D., regarding sanitary dangers in use of chipped china, the Journal of the A.M.A. says:

"From the esthetic point of view the use of chipped or cracked table ware is to be discouraged. In the presanitary days, when but limited attention was given to cleansing and disinfection, the crevices of chipped dishes were packed with particles of food and living bacteria. While it is possible to sterilize chipped or cracked dishes, few eating places carry out adequate disinfection so as to eliminate the menace of the chipped utensil. Even though replacements are now difficult, most health authorities, for the protection of the people, prohibit the use of chipped table ware." Journal A.M.A., Nov. 4, 1944, pg. 670.

* * * * *

Ringworm Epidemic,—An outbreak of ringworm among school children in Jersey City had reached epidemic proportions, according to Dr. Claudio E. McNenny, chief of the communicable diseases division of the city board of health, as reported in the New York Times, September 29. A special clinic has been opened in Jersey City to treat children suffering from the infection, which is said to be highly contagious. Journal A.M.A., Nov. 4, 1944.

A HOT LUNCH FOR THE SMALL SCHOOLS

VERNA PAYSON

Supervisor, Home Economics Education, State Board of Education, New Hampshire

The noon lunch for children in school should provide one-third of the day's food requirements. This may be a lunch eaten at home, a packed lunch eaten at school, a hot lunch prepared and eaten at school or a combination of the last two.

Some of the cities and the larger towns in New Hampshire have hot lunch programs, but in only one of these communities does every child have an opportunity to secure a hot lunch at school. The picture in the smaller towns is even more discouraging. There are approximately 50,000 pupils in elementary and rural schools. Only about 28% of the schools below the junior high school level are serving a lunch of some kind at noon. Of this number 40% have milk only. By simple arithmetic it can be estimated that approximately 5,700 children receive milk at school and 11,428 children receive a lunch varying from one hot dish to a complete meal. This might sound like a lot of children receiving a hot lunch until it is reduced to percentages. 11.4% of the children in elementary and rural schools have an opportunity to obtain a hot lunch, but this is on a voluntary basis and only part of this small group actually partakes of a hot lunch. There are few children who cannot afford the few pennies charged for a hot lunch and in many cases even those children are provided with the same lunch served to other children.

Why are not hot lunches made available to more children in high, elementary and rural schools? Adequate facilities for preparing and serving a hot lunch are lacking in many buildings. Interested persons in some communities have been ingenious in devising make-shift arrangements for this purpose. The objectives for a hot lunch do not vary whether it be a lunch in a one-room rural school or in a well-equipped city high school. Briefly stated, they are:

1. To provide a simple hot meal which includes one-third of the day's food requirements.

2. To develop good food habits and a liking for foods which are simple, nutritious and suitable for growing children.

3. To provide a pleasant social atmosphere where courtesy and simple table etiquette are practiced.

The space and equipment required to realize these objectives vary according to the size and scope of the lunch program. The

larger schools may have rooms and equipment which are used only for the preparation and serving of the school lunch. In many schools it will be necessary to use a room originally designed for other purposes. Where there is a home economics room, this may be the best place for the school lunch. Where the home economics room is used both for the preparation of the hot lunch and for class-room work, definite plans should be made so that there is no conflict in the matter of equipment and working space. This can usually be done where the lunch program is a small one.

A certain amount of lunch preparation may well be combined with class work for home economics pupils. This calls for skillful planning and in schools where a paid worker is employed for the preparation of at least a part of the lunch, cooperation between the teacher and the paid worker is essential. The leadership in such a cooperative plan should be taken by the home economics teacher.

New Hampshire had in 1943-44, 4,635 pupils in 239 rural schools with one teacher, together with about 334 elementary schools with two to four teachers in each building. There are over 11,000 elementary school pupils transported daily in the state, many to these smaller schools where only a relatively small number have any kind of a hot lunch.

In the small schools, particularly the one-room rural building, it is possible that the only stove available is the one which heats the building and this may or may not be a type which can be used for even heating food. In such a case a three-burner oil stove with oven is almost a necessity. Other practical necessities are a sink (with running water where it is available) and a storage cabinet for food supplies and dishes.

While it is difficult to prepare and serve any kind of a hot lunch without adequate facilities, teachers who are vitally interested in this problem have done a great deal by serving one hot dish each day during the winter months. This is usually a hot soup which is preferable to hot cocoa. Sometimes the soup is a canned soup to which hot milk is added. In other cases the soup is a "home-made" dish which is to be preferred as it usually contains more nutritious food and is less hightly seasoned than canned soups. Where an oven is available (this may be a portable oven on top of an oil stove) baked dishes such as scalloped meat, fish or vegetables, macaroni and cheese, or even a baked fruit pudding, may be prepared.

A serious problem in the smaller schools is that of the work involved. While the teacher must carry the responsibility, it is usually possible to have older children, both boys and girls, do some

of the actual work. Menu planning, market lists and cost records can be made a part of health teaching, geography and arithmetic assignments. Serving the lunch is another problem, particularly where the desk tops are not level. If there is space in some part of the room it is well to set up folding tables and have benches or chairs. The cleaning of these tables and the floor, and washing of dishes provide an opportunity to teach neatness, orderliness, and cleanliness to all children from the first grade up.

Community organizations have contributed dishes, food supplies and service in the preparation and serving of the meals. Any school lunch should not be operated at a profit, neither should the income from these lunches be used to purchase equipment. The maximum amount of food for the money available should be served in order that the greatest benefits may be derived by the pupils.
Reprinted from New Hampshire Health News, January, 1945.

* * * * *

Fellowships in Health Education,—Fellowships for graduate work in health education are being offered to qualified applicants by the U. S. Public Health Service, in cooperation with the National Foundation for Infantile Paralysis, Surgeon General Thomas Parran has announced. These fellowships for the collegiate fall term of 1945 are being awarded to meet present and future needs for trained health educators in schools, communities, and local, State and Federal health departmentss.

Men and women between the ages of 22 and 40 who are citizens of the United States and who hold a bachelor's degree from a recognized college or university may apply.

Fellowships will lead to a master's degree in public health. The 12 months' training period will consist of nine months in the School of Public Health at the University of North Carolina, Yale University or the University of Michigan, and three months' field experience in community health education under supervision. Applicants must meet the requirements for admission to the Schools of Public Health. Training in science, sociology, education, and psychology, plus experience working with people are desirable prerequisites.

The fellowships provide a stipend of $100 a month for twelve months, full tuition, and travel for field experience. Candidates must pay their travel to and from the university at the beginning and end of training.

Fellowship application forms may be obtained from the Surgeon General, U. S. Public Health Service, Washington 14, D. C. Applications must be accompanied by a transcript of college credits and a small photograph, and must be in the office of the Surgeon General not later than June 1, 1945.

HOT LUNCH PROGRAM

RUTH M. CUTTER
Supervisor of School Cafeterias, Concord, New Hampshire

Ever since the beginning of the government lunch program Concord has accepted it and today we have a lunch service in every school but one elementary. This school is a third grade school in the center of our city, where in the cold months we send hot soup prepared in one of our kitchens. We do serve in all nine elementary schools the type "C" lunch at recess which consists of a bottle of pasteurized milk and graham crackers.

Our Senior High does not operate on the subsidy program, here we serve a meal, cafeteria style, where students may make selections, and after all I feel here is where we can see the result of our previous training.

We differentiate our lunches and hot lunch, and it is the latter that I will discuss in this article. The hot lunch where no choice is given is served in eight elementary schools. Each school has a kitchen with a high type woman preparing the lunch. A very simple meal is served of a main dish, sandwich, dessert, and a bottle of milk. Until our schools went on the sixty minute period at noon we served home made hot bread but since the inauguration of this shorter period a year ago this September, we have served dark bread sandwiches only. A ten cent charge is assessed each child but no charge to ones who cannot afford ten cents. The principal and the nurse recommend the children who are unable to pay. Our worker receives five cents for each paid lunch, is provided with a white uniform and allowed a five-day sick leave.

Last year with three lunchrooms not opening until December and one less than we have this year, we served 70,427 meals with 8,365 served free in our elementary school. Our recess lunch consisting of milk only and served in the same schools totaled 90,745 half-pint bottles of milk.

Two things we are trying to eradicate:

First, to eliminate fads and fancies by eating all foods unless they are actually allergic to them. It has almost become a slogan with American children to say "I don't like this and I don't like that" and this has been too long honored by parents.

Second, to overcome a "feeding station" atmosphere in our dining rooms and make it a strong educational factor in our school curriculum. We mean to teach reasonable courtesy, thoughtfulness of others and table manners.

To obtain these objectives last Spring three principals, our elementary supervisor, and myself met and prepared the following outline to be mimeographed and put into the hands of every elementary principal this fall.

Aims and Objectives

1—Serve simple well balanced meals which comprise one-third of the child's daily needs.
2—Develop proper eating habits and cultural aspects.
3—Encourage eating a variety of foods and overcoming food fads and fancies.
4—Understanding the relationship between growth and development and such factors as food, rest, play, etc.

Lunchtime an Educational Experience

1—Avoid "Feeding station" atmosphere.
2—Lunchtime an enjoyable time for teachers and pupils.
3—Things to achieve.
a. Sufficient time spent in dining room for truly educational experience. b. Avoid talking with food in mouth. c. Correct table setting. d. Host and hostess clubs with duties. e. Correct serving. f. Wash hands before working or eating in dining room. g. Blessing before meals. h. Thoughtfulness of others. i. Etiquette during meal service, as,
(1) Use of napkin. (2) Use of tools. (3) Correct handling of food. (4) Table conversation.

Subject Correlation

1. Art.
2. Arithmetic.
3. Health and hygiene.
4. Social behavior.
5. Geography and history.
6. Language arts.
7. Music
8. Physical Fitness.
9. Science.
10. Spiritual side.
11. Assembly programs.

Parents—Community—Teacher—Pupil—Cooperation

1. Parent and community.
a. Assist in daily preparation in larger programs (b) Canning during summer. c. Donate food for storage. d. Substitution for cook.

2. Teacher.
   a. Dining room arrangement. b. Dining room management. c. Educational part of program. d. Schedule for pupil duties.
3. Pupil.
   a. Gather flowers for decoration. b. Plant seeds for fall harvest. c. Plant fruit trees, rhubarb, etc., on grounds. d. Table setting, table service, clearing tables, washing of dishes.
4. Cook.
   a. Prepare meals. b. Serve meals. c. Entire responsibility of kitchen and storeroom area. d. Full cooperation with staff. e. Be an example to children. f. Watch voice and keep it in control.

Periodic Improvement Checkups

1. Improvement in school attendance.
2. Improvement in school work.
3. Gain in height and weight.
4. Interest in social behavior.
5. Improved food habits both at school and at home.

Poster Library at Parker School

1. Change monthly and make use of same.

Newspaper Publicity

1. Principal to take charge of this.

While we have accomplished much in this program, we feel there is much yet to be done in Concord before the above outline will be freely realized in letter and spirit.

It might be of interest to you readers to know the simple, nonsectarian blessing we use before each meal:

We pray Thee, Father, bless this food
And keep our bodies strong;
And help us Lord to live for Thee
And serve Thee all day long.

The success of this program is due to the unlimited cooperation of our school boards, superintendent, principals, parents and pupils. — Reprinted from New Hampshire Health News, Dec. 1944, p. 216.

HEALTH SUPERVISION IN THE NEW HAMPSHIRE SCHOOLS

ELIZABETH M. MURPHY
Supervisor of Health, State Board of Education

School health service in New Hampshire Schools has increased in size and functions since its beginning in 1919 when "health supervision" supplemented the optional "medical inspection" law passed in 1913, empowering school districts to employ a school physician to examine pupils, teachers, janitors, and other employees in public and private schools. Few districts adopted the provisions of the act. Districts where the law has been adopted must comply with its provisions.

Health supervision includes not only the health or physical examination of pupils and employment of school nurses but a constant oversight for evidence of communicable disease, immunization measures and a follow-up program for the prevention of illness and corrections of physical defects.

An annual health examination of all pupils is required by the regulations of the State Board of Education and this examination may be made by a physician or a registered nurse. The local school boards carry out the provisions of the regulations and are responsible to the State Board of Education.

The aims of the health examination are:

To evaluate the child's physical condition.

To discover physical defects which interfere with or prevent physical development and retard school programs.

To obtain correction of physical defects.

To improve general health conditions.

Parents may protest in writing against the examination of their children, except an examination for communicable disease, but practically no objection is offered and the examination is accepted as other phases of education are accepted.

Parents are notified in writing of physical defects and a constant effort is made by teachers and nurses to have these conditions corrected or improved.

The State Board of Education, through its supervisor of health, a registered nurse, assists districts in making their health supervision effective, cooperates with school physicians, and furnishes advice and directions to school nurses and school officials on matters relating to the physical welfare of school children.

During the past year seventy-three physicians examined the pupils in eighty-two districts. Lack of physicians in many places, due to the war emergency and pressure of work upon those left at home, resulted in examinations being curtailed.

The law requiring an annual examination of every pupil is somewhat obsolete. The American School Physicians' Association and other leading public health organizations have made recommendations to include a more thorough examination of pupils in certain grades each year. This would result in a more complete and careful examination of every pupil several times during his school life as more time could be given to the examination. This examination supplemented by frequent inspections and daily observation by the nurse and teacher would undoubtedly be of more value. The health examination should be an educational experience for each child.

The care of the health of pupils is one of the "requirements for a standard school." The health provisions of a standard school include adequate natural and artificial lighting, heat and ventlation, proper toilet facilities, a safe water supply and sanitary drinking and washing facilities, and suitable provisions for the care of the health and physical welfare of all pupils.

Districts are encouraged to employ school nurses and the expense thus incurred is in state-aided districts considered a part of the necessary expense of maintaining elementary schools. Every district in the state has the services of a full-time or part-time school nurse. Eighty-two districts have both a physician and a nurse. With the examination by the physician supplemented by the continuing program of the school nurse, the service becomes increasingly effective. Cities and larger towns have their own nurse or nurses. Smaller districts are combined to make nursing service available and a nurse may cover several districts. One nurse is now serving fourteen small districts. This arrangement allows for a continuous service of health supervision in districts where it otherwise would be impossible.

In 235 districts 91 school nurses are employed as follows:

Forty full-time nurses serve 147 districts covering from one to fourteen districts. The Manchester Board of Health employs six of this number.

Thirty-five Red Cross or district nurses act as school nurses in 54 districts.

Sixteen part-time nurses serve in 34 districts.

Where district and Red Cross nurses act as school nurses the school districts through their appropriation for health reimburse the employing organization for the nursing service. These services are under the supervision of school authorities including the superintendent of schools.

The school nurse includes among her duties and activities, assisting the school physician in the examination of pupils, inspection of pupils where no school physician is available, arranging for correction of physical handicaps as necessary, contacting specialists, hospitals and clinics, and giving continuous supervision to the health of pupils under her charge and aids in planning special health projects. She also cooperates with the teacher in making the annual vision and hearing tests.

When the need arises, clinical facilities are organized to meet these needs. Dental clinics in small communities are arranged for children whose dental care would be delayed or not done at all. Bringing the dentist to the children has resulted in better dental care for children living at a distance from a dentist.

The school law requires an annual examination of vision and hearing of all pupils.

An audiometer is used for group hearings tests. Four districts own their own audiometer, one is owned by a supervisory union, and seven are owned by the State Board of Education. Five of these are the gift of the American Legion and Auxiliaries and used in designated and other districts. The other audiometers are loaned to school district and they are all kept in constant use.

At the present time the Snellen Chart for testing vision is commonly used although a few districts are using other tests. Vision tests will be improved as new techniques and equipment are developed.

A continuous health record is kept of every pupil on the form provided for that purpose, including a history of communicable diseases, immunizations, illnesses or handicapping conditions and other information pertinent to giving intellgent health supervision.

As the nurse works through the home, as well as the school, there is a continuity of service and knowledge of the pupil's needs. Through home visits the nurse explains the nature of physical defects and conditions requiring attention or care.

Emphasis is placed on the prevention as well as the correction of physical handicaps. Finding defects is only the first step. Correction or improvement is the second. Many parents are sufficiently self-supporting to meet expenses involved in extra care which children need. The reverse is also true. In such instances financial assistance is necessary and available through state and local health and welfare agencies. Hospitals, physicians, specialists in various fields, and dentists are generous with their resources and skill.

Without the services of the nurse there would be little or no health supervision. The doctor's examination and other health ex-

aminations would fail of their objectives and the majority of children would go without the needed and recommended care.

No school nursing program once established has been dropped even when reduction in school expenditures were necessary. School officials, teachers, and parents have grown to depend and rely upon such service.

The school nurse utilizes the facilities available through the state departments and private health agencies for promoting health and correcting defects. All of these agencies generously contribute their services and provide many opportunities for making the school health program more effective and of real service to children. Reprinted from "New Hampshire Health News," Feb., 1945, p. 28.

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Heart Disease in School Children,—According to Williams and his collaborators, heart disease ranks high as a cause of death among children over the age of 5 years. In the national figures for the year 1939 heart disease was second to accidents as a cause of death in the age group 10 to 14 years. The figures for the state of Delaware indicate the same tendency. For the entire age span from 5 to 19 years heart disorders caused more deaths than any other condition except accidents. Examination of the hearts of 2,900 children of Kent and Sussex counties in Delaware disclosed 22 children with clinical evidence of organic heart disease, a prevalence rate of 0.7 per cent. Of this group of 22, there were 9 with murmurs characteristic of congenital heart disease and 13 with evidence of rheumatic heart disease. The latter condition was fairly evenly distributed between the children of the elementary and high schools, but was somewhat more frequent in the Negro than in the white children. Arrythmias consisting of 6 cases of extrasystoles and 1 of bradycardia were discovered. A group of 59 additional children had slightly abnormal cardiac sounds which were designated as accidental murmurs. The survey suggested the need for a program for the supervision and care of these children with heart disease. Such a program would include the following activities: 1. Case finding, with reports from physicians of cases of heart disease or rheumatic fever; 2. A central file of the records of these children. Such a file has already been started for records of children found in school surveys; 3. A consultation service with a thorough examination of children suspected of having heart disease; 4. Adequate care of acutely ill children to include beds for those requiring prolonged convalescent care; 5. Broad educational programs for instruction of nurses, physicians and the public in the problems of heart disease, the dangers of rheumatic fever and the methods of care. Delaware State Medical Journal, J. W. Williams, M. Dressler and R. S. Snow. Abstracted from Journal A.M.A., Nov. 4, 1944. pg. 660.

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EDITORIAL

The articles in this issue of the Journal of School Health are concerned with efforts toward better nutrition and better dental conditions of children. These factors in child health undoubtedly are closely related; how closely we do not know precisely.

During the last five years, there has occurred in this country the greatest migration of families the nation ever has seen, far exceeding even the transcontinental migration of the late 1840's and the 1850's, the latter migration stimulated and caused by the search for fertile "free" land, and the passion for gold.

This recent movement of families, in order to participate in "war work" at high wages, has been a definite harm and menace to children. They have been imported, often from rural and small town areas, and squeezed into inadequate and sometimes unsanitary housing, often both parents, and the older children, are working, with a resulting chaos in family living, especially as to normal adequate time and place for sleep, for safe recreation, and more particularly for the properly planned dietary and adequate preparation of nutritious meals. Many of these families have been getting an income far beyond any they had ever hoped for, but the health of the children—physical, mental and moral—has definitely deteriorated.

Many of the communities to which these families have gone, apparently have been much more interested in the health and other welfare of these children than the parents have been. These articles deal with some of the efforts toward nutritional protection.

So far as the dental health of children and youth is concerned, the figures on the terrible array of dental defects found among drafted men present ample evidence that our people are dentally illiterate and seemingly do not care if they are. Any research that presents any possible means of preventing these dental ravages should be encouraged and its results broadcast.—*C. H. K.*

ABSTRACTS AND NOTES

*Recent Advances in School Health**,—The school health examination has long been accepted as a primary function of school health service. The medical findings among American draftees examined during World War I were a powerful influence in securing the enactment of laws regarding medical inspection of school children. In the period 1917-1924, such laws were passed in twenty-four states. Now forty-three states have a statute either permitting or requiring the examination of children for physical (and sometimes mental) defects. The school medical examination as performed annually or "routinely" has been severely criticized both as a costly and inaccurate case-finding method and as a bad educational experience. As educators and pediatricians realize that medical procedures in the school can and do have educational implications, the trend is toward fewer, but more thorough, medical examinations for individual pupils. The value of the presence of the parent at the examination, especially of younger children, in terms of health education as well as treatment, was demonstrated by Walker and Randolph, and by Nyswander. In the elementary school, according to Wheatley, the school examination resembles a health conference. The school physician, in appraising the health status of the child, utilizes information based not only on the physical examination, but also on the interview with the parent, and frequently, with the school nurse, teachers, and other members of the school staff. Wilson called attention to the educational opportunities of the school examination. Spock has demonstrated how the modern school physician contributes to the guidance program of modern education. The American Academy of Pediatrics reported that in many communities the functions of the school physician and nurse are being defined in terms of health education.

As the school medical examination has become an improved instrument of health education, it has become more time consuming and consequently more costly in case-finding. Efforts have been made to develop more practical means of health supervision and case-finding among school children. These have been: (a) use of

screening procedures annually or semi-annually to detect children with poor vision and hearing and other specific abnormalities; (b) promotion of teacher interest and observation of pupil health from day to day; and (c) stimulation of the participation of the private physician and dentist in the school health service.

Experience With Screening Tests,—The Snellen test for vision defects is the best known of screening tests in the schools. The Division of Child Hygiene of the Massachusetts Department of Public Health studied the Snellen test as usually given in the Massachusetts schools and concluded that the test is too coarse a screen. The outcome of this survey is a new method of testing the vision of Massachusetts children. On the other hand, the Astoria Study demonstrated that the Snellen test, when used in combination with teacher observation of signs and symptoms of eye strain, is a practical method of screening vision defects. As in the Massachusetts study, the Astoria report emphasized the necessity of maintaining standard testing conditions. The Astoria Study also showed teachers may be as accurate as nurses in the selection of visual defects. It was recommended on borderline cases of 20-30 and 20-40 that the nurse check the teacher's score, but on severe defects of 20-50, or worse, it was unnecessary to have the nurse retest the children.

Some school health services have applied the screening principle to other phases of the health examination. Heart disease is a relatively common and serious finding in children of school age. The usual periodic school examinations are very unsatisfactory for the accurate diagnosis of heart disease. Some communities do not permit the removal of clothing; the school physician has only a few minutes to spend on individual children; he does not have the advantage of a fluoroscope or X-ray. In New York, Cincinnati, and Rochester, N. Y., the school physician "screens" out possible cases of heart disease. These children are referred to a diagnostic service where the examining specialist has the advantage of more time and laboratory aids for a diagnosis. By this careful procedure more accurate diagnosis of a serious condition is assured and modification of the school program can be based on a clearer understanding of the child's physical potentialities.

The Classroom Teacher's Role,—Nyswander demonstrated that the teacher's responsibility for observing the health of her pupils can be made an effective part of the school health service. Teachers were prepared to observe and report to school nurses the health condition of pupils. The annual school medical inspection was replaced by annual and semi-annual conferences between classroom teacher and school nurse. After teachers had received preparation, eight

out of every ten children selected in these conferences, when examined subsequently by the school physician, were found to have a health condition requiring further medical attention. The study also revealed that teachers need more knowledge of and experience in observing health behavior and recognizing health deviations. It should be understood that this preparation of teachers is not for the purpose of assuming work to save the time of nurses and physicians, but primarily to enable the teacher to perform more ably one of her important responsibilities. The State Superintendent of Schools in Michigan has published a helpful guide to aid teachers in the observation of the health of pupils.

An elaborate program of environment control is reported by Harmon of the Texas State Department of Health. His investigations suggest that environmental conditions in the classroom may be factors in the development of health problems. Among the findings he reports are: (a) 49 per cent of children with eye defects had already developed body asymmetry or were subjected to poor environmental conditions, such as improper lighting and seating, which might tend to produce body asymmnetry; (b) about two-thirds of the children with nutritional deficiencies were in classroom situations where programs were not related to their physiologic needs or their natural physical capacities; (c) behavior difficulties increased from 4 per cent to 10 per cent during elementary years.

Attention is centered on the school lunch as a factor of increasing importance in the school child's environment. Koehne suggests ways of developing a strong school lunch project which makes the lunchroom and the noon meal an integral and vital part of the health education program of the school. Mention is also made of undesirable dietary practices followed in many schools, such as the sale of candy, commercial fruit beverages and soft drinks, potato chips, and popcorn, which divert the child's lunch money from the purchase of needed nourishment.

It is impossible, while interpreting developments in school health service, to ignore the influence that the mental hygiene movement in recent years has had on such service. In addition to the abundant literature relating to mental hygiene in the classroom, there is evidence that the school medical service has recognized the importance that emotional disturbances, especially in wartime, can have on the health of the school child. Patry suggested that school physicians and nurses take cognizance of significant change in the child's habitual reactions. Abnormal forms of fear, anxiety, hate, aggression, tension, insecurity, confusion, excitement, depression of

spirits, and unhappiness are all symptoms which must be evaluated. Spock said a large number of cases of poor appetites, poor sleep, overactivity, and poor school work are directly ascribable to inner emotional disturbance, often traceable back as far as infancy.

War's Impact On School Health Service,—The war has brought new problems to the health services in the schools. On the one hand, there is an increasing shortage of physicians and nurses—never an oversupply in this field. On the other hand, the schools are being called on to extend their services to fill the gap in the daily lives of children because of the disorganization of family life, resulting from many parents' going into military service or industry. The necessities of war have made administrators of school health service study the functions and methods to determine what practices are most essential and what functions may be safely discarded or assigned to less highly trained workers. Swanson, Grout, McNeil, and Ross have discussed the school nurse's task and suggested ways of conserving the school nurse's time. Willard, in outlining a constructive program of school medical service for wartime conditions, urges that more attention be given to the development of adequate treatment facilities. The Joint Committee on Lay Participation in School Nursing has made a statement of policy to guide school administrators in effective use of the school nurse during wartime.

The extension of the school program not only to care for children of school age, but to include children of preschool age is adding new responsibilities to the school health service. There are advantages to this situation because these new problems are a challenge. From the preventive point of view more constructive health work can and should be done with the preschool group. Many of the dental and medical findings and behavior disorders observed among kindergarten and first-grade children have begun at ages 3 and 4. The Victory Corps program and the increase in vocational high school enrollment have made great demands on the school health service in many communities. The medical examinations of this older age group reveal many neglected health conditions and reflect the inadequacy of health programs in most high schools and vocational training schools.

Conclusion,—Within the limits of this review it has been possible to sketch only some of the highlights of more significant developments in school health service. Some gaps are inevitable. Specific research in growth and development of great significance in school health service has been omitted.

There are still great distances to travel. We must not permit

the war to close our minds to further progress. In fact, the emergency can be used to discard inefficient, outdated practices.

*Excerpts from an article in Journal of Pediatrics, April, 1944. Reprinted from Health Education Journal, Los Angeles City Schools, December, 1944, p. 8.

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Rabies,—A case of human rabies, the first reported in an upstate New York resident since 1930, occurred recently in the town of Sheridan, Chautauqua County, where canine rabies has existed for the past year. The victim of this always fatal disease, a sixty-year-old farmer, contracted the illness as the result of having been bitten on August 13 by a rabid dog owned by his family. He died in a Dunkirk hospital, November 9.

It is noteworthy that eighty-four days elapsed between the date of the bite and the development of symptoms. While the incubation period of rabies in man is generally shorter, usually forty days, longer intervals are not uncommon. Cases are on record in which the incubation period apparently exceeded a year.

In view of the occurrence of this case in the western part of the State, the following information concerning rabid animals reported in counties in that section is pertinent, particularly with respect to the variety of animals involved. Thus far this year there have been reported from Chautauqua County: 34 dogs, 22 cows, eight cats, 14 foxes, one raccoon; Erie County, 55 dogs, five cows, two goats, and one cat; Allegany County, 11 dogs; Cattaraugus County, 37 dogs, two cats, one horse; Orleans County, four dogs; Genesee County, one cat; Monroe County, one dog.

Recently the New York City Department of Health announced the occurrence of a case of human rabies in the Bronx, the first recorded in that borough in more than eight years. The victim, a woman fifty-three years of age residing in the Bronx, contracted the disease as a result of having been bitten on the hand and lip (severe laceration) by her own dog on August 25. The wounds were cauterized with fuming nitric acid, and antirabic treatment was begun the same day, but the series of injections had not been completed when she first became ill on September 10, sixteen days after the bite. She died September 13. Special laboratory tests on portions of the brain of the dog, which died August 26, disclosed the presence of Negri bodies.

Wounds inflicted by animals suspected of having rabies should be cauterized immediately with fuming, or concentrated, nitric acid, using a tapered glass rod. In cauterizing the wound, vaseline should be applied around it in such a manner to prevent the acid from spreading. An anaesthetic should be given if necessary.

Prompt use of antirabic vaccine is indicated in the case of all

persons bitten by an animal with clinical signs or symptoms suggestive of rabies; of persons bitten by a stray animal that cannot be located for observation, particularly in an area in which rabies is known to exist; and in all instances in which the laboratory examination of the brain shows the animal to have been rabid. In the Chautauqua County case no vaccine was administered, although offered. In the case in the Bronx, vaccine treatment was begun promptly, but, apparently because of the bite on the lip, there was insufficient time to avert the illness.

The most effective control measures in the prevention of the spread of rabies among dogs are strict enforcement of the dog licensure law and the elimination of all stray dogs. In areas under certification for rabies, additional important measures are immediate reporting to the local health officer of all animals having or suspected of having rabies and enforcement of the law prohibiting any dog from being at large. A further safeguard is vaccination of dogs against rabies, the value of which appears to have been established by recent field trials. The closer the co-operation between the public and health officials in carrying out these procedures, the sooner will rabies in any community be suppressed.—Health News, 21: 169, October 2, 1944. Abstracted from Health News, N. Y. State Department of Health, Nov. 27, 1944. p. 203.

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Notice,—*The Committee on Standards* of the American School Health Association desires information regarding the physical set-up for school nurse facilities——where the nurses room should be, what its equipment should be, and its architectural design.

Will all readers of this Journal who have suggestions or recommendations regarding these facilities please send them to Helen A. Cary, M.D, 304 City Hall, Portland 4, Oregon (Ed.).

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MEETINGS

The War Conference Meeting of the American Association for Health, Physical Education, and Recreation, planned for April 21-24 at St. Louis, and the Third Conference meetings of the **American School Health Association** and of the American Public Health Association planned for September 17-20 at Chicago, have been postponed because of war time travel and hotel conditions.